Electricity," all his own results appeared to fall in naturally with the general views therein explained. He considers, that the direction of the force through an electrolyte may be expressed in the very words employed in that paper to describe that of the direct inductive force in statical electricity, simply substituting the term *Electrolyte* for *Dielectric*, and the term *Current* for *Induction*.

Experiments are further described, in which the effects of various combinations of different generating and conducting surfaces, placed at different distances apart, were measured by the calorific galvanometer, from which the following conclusions are drawn:

1st. That the energy of the force is about sextupled by the absorption of the hydrogen at the conducting surface; except in the case of equal plates, when it is more than quadrupled.

2nd. That the effect of distance is much more decided in the instances where the amount of the circulating force is greater, than in the contrary cases.

3rd. That the amount of force put into circulation from a large surface of zinc towards a central ball of copper, is, as in former instances of similar combinations, about one half of that from the reverse arrangement.

4th. That a ball of zinc, exposing a surface of 3·14 square inches, placed over the centre of a plate of copper, exposing on its two sides a surface of 28 square inches, sustains an action of nearly the same amount as a plate of zinc, of the same dimensions as the copper, placed at the same distance.

In conclusion, the author remarks, that the principal circumstance which limits the power of an active point within a conducting sphere, in any given electrolyte, is the resistance of that electrolyte, which increases in a certain ratio to its depth or thickness; and this thickness may virtually be considered the same wherever the included point may be placed, but increases with the diameter of the sphere. In an insulated hemisphere, however, the approximation of the active point to the lower surface virtually decreases the thickness of the electrolyte, and consequently the force increases. In this respect, the action of a point upon a plate may be considered the same as upon an indefinitely large hemisphere, towards which, as the point approaches, the force increases.

February 8, 1838.

STEPHEN PETER RIGAUD, Esq., Vice-President, in the Chair.

George Lowe, Esq., who, at the Anniversary of 1836, had ceased to be a Fellow, from the non-payment of his annual contributions, was, at this meeting, re-admitted by ballot into the Society, agreeably to the provision of the Statutes.

James Bateman, Esq.; Joseph Glynn, Esq.; William Hallows Miller, Esq., M.A.; the Rev. Joseph Bancroft Reade, M.A.; Robert Bentley Todd, M.D.; and Alexander Tweedie, M.D., were elected Fellows.

A paper was read, entitled, "Researches towards establishing a Theory of the Dispersion of Light", No. IV. By the Rev. Baden Powell, M.A., F.R.S., Savilian Professor of Geometry in the University of Oxford.

In his former communications to the Royal Society the author had instituted a comparison of the results of observation and of theory with regard to the dispersion of light, in the instances of the respective indices for the standard rays in fifteen different cases of transparent media; and had found a sufficiently close agreement in the cases which gave the lower numbers; but there yet appeared to be an increasing discrepancy as an advance was made towards the higher. The theoretical formula employed in this investigation was one derived from the undulatory hypothesis, by a process involving some limitations, which rendered it only approximative. By pursuing the calculations to a greater degree of developement, or by adopting methods of a more precise character, such as those of M. Cauchy and of Mr. Kelland, the author was led to hope that a more close coincidence might be obtained. The formulæ of M. Cauchy, however, involved calculations of so elaborate and overwhelming a character, that he was induced to make trial of the method of Mr. Kelland, applying it, in the first instance, to the case of the most highly dispersive substance, namely, oil of Cassia, in which the greatest discrepancy had before appeared.

The object of the present communication is to state the results obtained, together with the necessary data employed in the calculations; and also to elucidate the general method, so as to render it more easily applicable to other cases which may arise in the further prosecution of the determination of specific indices. For this purpose a general statement is given of Mr. Kelland's method, in whose formulæ, it is easy, knowing the value of the wave-length in air, and taking the indices as given by observation for that particular medium, to introduce the values of the wave-length in the medium. Two of the constants are then determined for that medium; and by the aid of these, combined with the indices given by observation, a value of the third constant is deduced for each ray: and the verification of the theory will result from the equality of the respective values of this latter constant thus obtained.

The author then gives tables exhibiting the comparison of observed refractive indices with the results of Mr. Kelland's theory; first, in the case of sulphuret of carbon, at a temperature of 12° (centigrade); next, of the same substance at 22°; and lastly, of oil of Cassia: from which it appears, that the accordance between the results of observation and of theory is sufficiently within the limits of the errors in the experimental data to satisfy all reasonable expectation.

A paper was also in part read, entitled, "Experimental Researches in Electricity." Twelfth Series. By Michael Faraday, Esq., D.C.L., F.R.S., &c.

A letter was read from Dr. Marshall Hall, in reply to a note contained in the paper of Mr. Newport, published in the last volume of the Philosophical Transactions.